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FURTHER FACTS

IN

VISION.



BY EDWARD C. COOPER, M. D.

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NEW-YORK:

WILDER AND CAMPBELL, 142 BROADWAY.

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TO

J. W. FRANCIS, M. D.

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To you, who have already kindly noticed this treatise, and to whom I am otherwise indebted for much and lasting kindness, I dedicate this my first attempt before the public,

It is not so much for any honour that may be added by this to the many you are in the merited possession of, that I have solicit this favour of you. These honours you have obtained by your own actively great talents, united to your generous urbanity. To these I could add but little. Nor is it as a requital for the many and important services you have done me : for these it would make an inconsiderable requital. It is rather to screen my own youthful appearance, and



the many faults of this defective sketch, by placing you between myself and the public, as my patron.

Accept here, publicly, the acknowledgment and honest expression of those feelings I shall ever cherish through life for the attentions and important assistance you have rendered me when your pupil.

I remain your's,

Gratefully obedient,

THE AUTHOR.



TO  
**DRS. BALL & WENDELL.**

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WITH you, as the friends of my parents and myself, I began and finished the study of my profession. To you, then, I am thus doubly bound to dedicate this treatise, the first and early product of that education.

I hope you will accept this as the avowal of a sentiment ever uppermost in my gratitude to acknowledge, publicly, a debt that otherwise I should be unable to repay.

I am, Gentlemen,

Your respectful and

Obed't Serv't,

THE AUTHOR.



TO

JOHN COLE, M. D.

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As the friend of my youth, as the companion of my studies, I offer this to you as a new pledge, on my part, of our constancy in friendship ; a friendship that bids fair, mutually, to secure us our happiness through life.

The body of medical facts and observations you have thus early in life amassed, and these connected with the extensive study of your profession, from every other attainable source, already has deservedly distinguished you.

A source like this must increase. It will increase as age adds experience, and the hap-

py practice of your profession a deserved renown. Thus may it be my happiness to recognise you in future times—beloved, esteemed, and respected in the world, and my friend.

Your's,

THE AUTHOR.

## P R E F A C E.

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THIS Treatise was first suggested, and, from a temporary necessity, finished and delivered to a medical friend in eight days.

Since that time I have had but little opportunity to correct even those faults which are most obvious.

A time so short must necessarily exclude the close investigation of a subject, extending, like this, to all visible forms. Much must be left unnoticed; many facts forgotten; some necessarily not accounted for; and others imperfectly or even improperly so: all these defects will almost unavoidably exist.

Where also the facts are correctly represented, some still want a better arranging, and clearer definition.

But the hastiness of this production alone, I am willing to allow, is not a sufficient excuse for any of these faults.

There are other reasons that have induced me to publish it in this imperfect state.

It could hardly be expected that one mind was alone capable of perfecting a subject so extensive as this will show itself to be. Observation would universally prove the reverse of this ; and I am sensible of my present incapacity for so formidable a task.

Had I even retained it by me longer, and even until I had arrived at maturer years, it would hardly be probable that any change of, or addition to, the principles, would be made. All likely that would be done to it, might be the mere perfection of the arrangement ; the chastening of the style ; the probable addition of a few facts in proof ; with a farther practical extension in the application of these principles, as now laid down.

Of the latter I am conscious of my inability, and the triviality of the others may be overbalanced by other considerations.

These would be, likely, all the improvements that it would have received, after having thus preserved it longer from the public eye. It might then meet with a reputation that its character did not

demand. Authority might possibly fill up the defect of proof.

By presenting it now to the world, its faults will be visible ; but it is hoped that the facts contained will also be seen to be true. If the latter are found correct, I am satisfied. This is all that I have laboured for. These will be new, instructive, and amusing intelligence to the inquirer. As for the first, they affect nobody but myself, and I am relatively indifferent to them.

Being before the public, it may excite investigation from those more able than myself: it will be parcelled out among many, and receiving additions from all.

It is this that has mainly encouraged me in submitting it to the public vision.

But, had I retained it by me longer, I should still have been unable to properly pursue the extensive investigation of a subject, simply philosophical, like this. My time and continued study are required for my particular profession, that I have yet fully to learn.

These reasons, I hope, will account for what otherwise might be deemed hasty and inconsider-



ate. and, at the same time, allow of a partial excuse for the remissness in permitting it to appear with some more minute faults that may be found.

“

Indeed, it could hardly be expected from one who has just had his eyes operated upon to perfect his vision, that he should be able to see clearly, at once ; or that he should be capable of seeing any thing distinctly ; or of classifying objects properly. It is thought sufficient that he sees at all. The light is too strong ; is felt too sensibly, to see clearly. Besides, having been before guided by another sense, this may be liable to deceive him, by supposing many objects near, that are distantly beyond his reach. Many are too obscure for regular definition, and the whole are seen imperfectly.

If the reader perceives the connexion between this state and my own, I hope he will carry his perception but a little farther. He will then perceive the necessity for excusing much in this hasty treatise, and the possibility of an excuse for much more.

It is hoped that after all this defectiveness, however, the facts contained will be found interesting and useful, not only to the philosophic reader, but also to him who alone wishes its contents as adding to a more general stock of agreeable information.

For, although it may be somewhat of a philosophic investigation, it still may be interesting to the general reader. The experimental proofs are all plain, simple, and readily at the command of every one. They will equally amuse and instruct. They will please in the trial, by their simplicity, and surprise in the results, by their novelty.

The whole treatise, it is believed, will not only be pleasingly useful to the inquiring mind, but usefully pleasing to those alone in search of pleasure.

The author would have this little treatise considered as but an imperfect attempt to illustrate "some farther facts in vision."



## INTRODUCTORY REMARKS.

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BEFORE commencing an investigation of the subject of these sheets, it may not be improper to hastily go over what is known of vision already.

Vision, itself, is the perception of objects at a distance. This is done, by the transmission of light from them to the eye. Light, being hence the source of all vision.

The manner in which light produces the phenomena of vision, naturally divides itself into those connected with the laws of light alone, prior to its transmission into the eye.

2. The effect the eye itself has upon the light when within it; and lastly, the more immediate arrangement of the eyes themselves.

The first of these divisions, throughout its whole extent, has been fully examined and delineated, its theory has been studied and portrayed with the greatest accuracy.

The second is also well known. But the third is still imperfect. The anatomy and motion of the eye are familiarly demonstrated. It is likewise shown that distance is judged of in this manner, by the greater or less acuteness of the angle made by the two visions. These, however, make nearly all that is known.

What it is that belongs to this division, will be explained as we proceed further. We shall sketch out the nature and effects of the two first divisions, in order that there may be greater certainty in finding out what belongs to this third and last.

It is into this last division, that these further facts will extend. We proceed to consider the first division of sight, as connected with the laws of light, prior to its entrance into the eye.

The laws of light are all well defined. This has been done with an almost mathematical correctness. Light itself may still excite the doubts of the curious, as to its nature. Whether it is a substance, or merely an effect of matter upon other matter, is still disputed.

But the laws which regulate it in its passage from one place to another, are nevertheless known accurately. No subject has been more beautiful

in its investigations, few more certain, plain, and definite in their results, than the phenomena of light, and their regulation.

The great source of light to this earth, the sun : the rapidity with which its light passes to this earth, requiring but a few minutes, for its transmission, have ever presented themselves to the astonished observer's curiosity, exciting his wonder at their immensity, his admiration of their regularity.

But many of the more minute laws of light that are immediately noticed about us, have been more closely studied ; as its division into all the known colours of objects ; the reunion of all these into white ; or their total absence or absorption, making darkness, or its black representative. All these have formed a curious set of experiments, adding a new pleasure with every investigatory step.

What has led to the most curious and interesting results is, its refraction, when passing into and out of, denser or rarer mediums.

It has been found, that as the transparent medium through which it passes, is heavier or lighter, in proportion it tends more or less to or from a perpendicular to its surface, and as it more commonly is to the centre of the earth.

Thus the light coming from the sun, turns several degrees more towards the earth while it passes through the atmospheric region surrounding it.

It is from this we see the sun rise and set, before and after the time, it properly would be hid from us. This is a wise provision. It adds a further length, the more useful part of the natural day, by lighting up an additional part at the beginning and end of the solar division of it, and which was more properly included within the precincts of the night.

If the light, after having passed through the air, falls upon water, it is refracted still more perpendicularly; and were it at the bottom of this to pass into some denser transparent medium, it would be still more inclined from its natural direction.

The knowledge of the reflection and refraction of light has been the foundation of many philosophical, and of nearly all optical instruments.

These are usually made in such a manner, that the light incident upon them is variously refracted from all their parts into common centres or foci. Upon the various changes thus given to the direction of light, a large proportion of these instruments are constructed.



It is upon this principle also, that so small a thing as the eye embraces extensive fields of vision at one time, and all perfectly seen. This effect of the eye upon light makes the second division. Of this, little will be said.

Light passing into the eyes from any object, all the rays from any or all parts of it, are collected together; the light, from each particular part of it, collecting into separate foci, upon the retina, lining the back part of either eye. Each and every part having thus a distinct representation of itself upon both eyes.

A singular circumstance occurs here, for this representation of any thing is necessarily in an inverted position to their natural one, yet by habit, we have learned to judge of them, and to suppose them seen as in nature.

The whole of this subject forms an elegant train of speculations that I must necessarily pass over; it not being intended to again define what is already known, but only to mention these facts as they are defined, to show more distinctly where further discoveries may commence. They are, therefore, thus hastily passed over, to arrive at the more immediate object of this treatise. These additional observations come more directly under the third

division, being in immediate connexion with the arrangement of the eyes.

Before passing to this, a brief review will be taken of such phenomena in vision as are produced by the two divisions of seeing now noticed.

This part of vision has been closely examined and accurately defined. The origin of light; its reflection from, or creation within the body seen; its passage from thence to the eye; the manner of its concentration into foci within it upon the retina; and lastly, the manner in which this is made sensible of the light, have all been minutely demonstrated.

From all this it has been shown, how objects are drawn upon the retina, forming an image upon it of every thing that is sensibly seen.

It was thus proved how we saw the shape, the size, and colour of objects. But these are in strictness nearly all that can be attributed to these two divisions.

Many circumstances in vision, and familiarly united with it, are therefore still left unaccounted for. Among these, are the great accuracy and regularity of sight; the correct idea of motion and of

distance ; the certainty with which the former can be traced, or the latter measured ; the apparent beauty or deformity of, and their gradations in, all visible objects ; why one scene should seem more pleasing than another ; why there should a regularity and simplicity in the arrangement of objects seen, to appear pleasing ; why one thing should be thought elegant, another simply please, and others appear defective in their beauty, or displeasing, by their defective or uncouth forms : These, together with many other circumstances, hold but little or no immediate relation to the laws and regulations of light. They appear to depend upon some other considerations, that are in connexion with the eyes themselves.

They have no very close relation to mere habit, or to education, nor are they owing to the colour, or degree of light, in which the object appears visible.

Either of the aforementioned divisions will not alone account for the great regularity of light, in particular. There are many reasons why they cannot. Of these, I shall be particular in the mention of but one.

It was long an intricate and dubious question, how, if the eye was a mere optical instrument, it should see near or distant objects with an equal

correctness. The cause of this is now known. It is known to be produced by the action, of what are called, the straight muscles of the eye. When looking at near objects, these are voluntarily relaxed, allowing the eye to assume its full rotundity. Of the relaxation of these muscles we may be sensible, if attentive. The brows and eyelids are very sensibly so. We, as it were, try to remove all pressure from the eyeball. This relaxed state is seen in full force in the stare of wonder. This is confined entirely to near objects.

It is also owing to the relaxation of the muscles of the eye, in this near vision, that the eyes are always fixed upon some near object, as upon the ground, when it is wished to be inattentive to their impressions, and leave them in a relaxed state.

This operation of the eye upon the vision is best noticed when looking at distant objects. Here, as is commonly and justly said, the eye is stretched, to behold them. At this time there is a sensible increase in the action of these muscles: the brows are now contracted, and all the muscles connected with the eyes are more or less in strong action, often so much so as to give a sense of pain about the eyes after looking thus a short time.

The action of these muscles flatten the sides of the eye, which they envelope, and are inserted into anteriorly. The consequence of this is, the elongation of the eye in the direction of its sight. The rotundity of the cornea is at the same time increased, and the crystalline lens, with the pupil before it, are also projected more anteriorly. All these changes combined have the effect of changing the eye to a fit shape, for seeing objects at greater or less distances in proportion to this action.

These changes in the eyes, accommodating them to all distances, make an excellent arrangement, which supplies an otherwise serious defect. This must, however, injure the regularity and accuracy of sight.

It is said, that where nature affects two purposes by the same means, one or both are more or less imperfect. This is aptly illustrated here; for although by this nice arrangement a thing is effected, otherwise impossible, still it must impair the principal use of the eyes, viz. the accurate observance of objects.

This power of the muscles being voluntary, and with an action extremely oblique, must be uncertain in the effects produced. It also changes the

angles in the refraction of light, more or less, as it changes the rotundity of the cornea.

It hence destroys all comparison of the difference in the visible size of different impressions, by elongating the eye to suit all equally, making them in this way similar to one another upon the retina.

All these modulations together must have a material effect in destroying any power of accuracy in the eye, when judging of the size, or distance, and in part even the form of any bodies seen ; and particularly if seen in different distances, or at different times.

All that is known of vision does not account for the absence of these defects, for the vision still remains with all its accuracy.

As this is not accounted for by the two first of these divisions of sight, it must therefore belong to the third, or to the immediate arrangement of the eyes.

In what exact way it is produced, and what causes are combined to produce it, will be made plain in the body of this treatise.

Other things in vision can alike be shown to be

unaccounted for by any of the laws of light, or by the immediate action of the eyes upon them alone. Thus the beauty of objects does not depend upon their colour, their size, nor the brilliancy of the reflected light from them. Either, or all of these may improve their appearance, but they do no more.

The colour of the mountain rock is not beautiful; its form is rough and unshapely; its size also is no additional recommendation, and the oftentimes contrast of the still surrounding water can but increase its deformity. Still the mountain view is thought sublimely grand, and its native elegance is in no way disparaged by the addition of the latter comparative view.

There is another imperfection in vision, that is still more general. It is the irregularities of light itself; particularly when reflected or refracted. This has a sensible influence on the sight, and must materially impair its accuracy.

Light is said to move in right lines, and to be reflected or refracted at certain angles. But with all this regularity it still has deviations from it.

This is more observable in the separation of light into the coloured rays, of which it is composed, as is visible in the rainbow, where the different de-



degrees, in the reflections and refractions of its different colours, cause the division of them, giving it the simple elegance so universally admired.

But, this is still owing to a defect in the passage of light, and this same defect operates in some degree upon the eye, and here, without any pleasing appearance, retains whatever is injurious, or lessens the accuracy of seeing, which is done in part by these diverging rays. This is seen in the twinkling of the stars in a clear night. The stars themselves are round. It is also seen in the radii of light from any brilliant object.

What is now said is sufficient for the purpose intended; it fully shows the necessity of accounting for many occurrences in vision, by some other way, than by those now known.

All that part of vision produced through the known laws of light, as has been remarked, has been fully observed and defined, and how this operated upon the eye, from its natural form and interior nervous arrangement. All this has still left the refinement of vision undefined. It might account for how things were seen, what they were, and their colour, but gives little further explanation.

All else, therefore, depends upon some other

cause or causes. It is to show, in part, the nature of these, the manner in which they operate, and the extent of their effects, that make the subject of intended investigation.

It will be shown greatly to depend upon the natural arrangement and division of sight between the two eyes, by which they together form a standard for the comparison of objects in a line with them.

That which relates to the appearance of objects in this line will be regulated by this power of comparing the vision, while in the perpendicular, the want of it allows of a change of form in the latter direction. Thus uniting beauty with variety, as is seen in those agreeable assemblages that delight the eye when looking upon scenic nature in her pastoral views.

It is not intended, however, to go into a full discussion of this third division of sight.

To do this would require a full anatomical history of their construction, and an extent of elaborate investigation, far beyond the limits I have had to prescribe to myself, and as the bounds of my observation.

It is only intended to disclose some few of the facts belonging to it, and more particularly the one subject in it already mentioned.

The reader's kind indulgence is asked for the extension of this introductory matter to its present length. The nature of the facts made it necessary.

## SOME .

### FURTHER FACTS IN VISION.

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THE design of this treatise, we have said, extends into the third division of sight, or that belonging more properly to the arrangement of the eyes, disconnected from any thing peculiar to the operation of the light upon the eye. It mainly treats of such occurrences as belong to the comparing of things horizontal with the two eyes. The whole of it is founded upon the accidental observance of a single fact. It is the reflexions and occurrences in connexion with this, or to which it has led to, in the further pursuit of them.

The whole train of these facts and occurrences I do not remember to have seen noticed, although curious as important.

That this subject has not been observed, I cannot at present be certain of, as I have but a par-

tial opportunity of reference to any books upon optics, and the facts have since appeared so universal in their influence, that I can hardly convince myself but it has. If it has not, it makes one of those singular circumstances, that, from great familiarity, have passed by our notice, and even philosophic scrutiny unnoticed.

This, in the present case, is the more strange, as it is after the elaborate investigation that has been given to this intrinsic and beautiful study, which appears as the great field where philosophic vision has emanated.

The circumstance noticed was the relation of each eye with its opposite, or an apparent consent of the two, by which they can mutually represent the whole of an object, alike in each, or greater than is embraced by either, by each forming the image of a part. That is, each eye may have an impression of the same, or a different object, or a different part of the same object, which, with that of the other, constitutes the image as a whole. This will also make a division of sight into two kinds; the one where the object represented in both is the same, and the other where they differ.

The fact that induced the observations contained in this detail, of itself, may appear trivial.

Upon my glass while looking into it, I saw a little spec; by concentrating the two eyes upon this, at the same time watching the reflection of the face upon the mirror, it was seen double, as was better seen of those parts nearest the centre of vision, as of the eyes themselves; each of which is seen double, making an appearance of four eyes instead of two. The spec at this time, being the object upon which the eyes are directed, is distinctly visible.

The obvious reason of all this is, that the two eyes are removed from their common axis of vision, the impressions of each no longer corresponding, except those of the object we are immediately observing.

And is not this the cause of our being able so accurately to distinguish any object, when particular in the observance of it, and of the apparent obliteration of all others at this time, from not concurring, and thus mutually destroying each other in indistinctness?

Again; by looking at the full face, as is done when ordinarily looking into a mirror, the spec is seen double, and but indistinctly, while at a short distance the whole face can be embraced in one common view, and fully observed in all its parts.

It will appear from these two observations alone, that there is a mutual relation between the two eyes, or a division of sight between them, as has been mentioned. It will also be obvious, that this mutual relation is extended in a line through the axis of the two eyes, that is in a standing posture horizontally, and that, observing bodies in this separate manner, in each eye, must take place mostly in this direction, and least in the perpendicular elevation of them.

In the common position of the eyes, the view simply in the latter direction, must be the same in both. In this direction there can be no difference of impression upon either eye, both being directed at the same time to the same point of elevation; and hence there can be no proper standard of comparison between one point and another, as in the horizontal.

In the latter, there is a difference of impression, and even a wholly different point of observation may be taken; and, consequently, from both a standard of comparison is drawn.

This latter effect may be destroyed by holding an angular body between the eyes, with one of its angles presenting, so that each eye sees but one side, the angle will appear indistinct and indeterminate.



As a proof of this division of the sight, between the power of comparison in horizontals, and the want of it in the perpendicular, we see at one view a wide extent of landscape, can survey the different points of it conjointly, and with material accuracy, compare one part with another, or their distance of separation.

But, in order to view the side of a mountain, or a steeple, we have gradually to change the point of vision, ascending or descending, nor can we take any distant objects upon them to compare, and from this fact alone is it, that we do not look for similarity between the base and apex of the one, nor the church and spire of the other; while we ever readily notice this sameness in the horizontals of any one point of their altitude.

Nor can we so readily estimate the height of these two, as we can an equal distance in the landscape, that is equally distant.

And it is from this, (the reader will excuse the necessity of a new term) horizontal comparison of objects, that we can tell the height of any object with less of accuracy than the horizontal length of it.

Another observation arising out of these, and

which has been cursorily mentioned, we will introduce here, leaving it for further experiments to illustrate more fully.

It is the apparent division of sight into two kinds: the first when both eyes were concentrated upon the same point of observance; the second where the object in each is more or less different, and simply in union with that of the other eye.

The former occurs in all cases where we are particular in the examination of any one object, and particularly if the object is small. The latter when taking more general observations, as where the eye roams over an extensive landscape, or when we extend our view over the ocean in a calm.

These two naturally divide in the cases mentioned, where we look minutely at the spec, or more fully and generally upon the face.

It may be further noticed of this, that there is a ready transposition of one into the other, and the apparently natural condition of the eyes, when engaged in the more general observance of objects, making the second species, and the more voluntary nature of the first.

To return to the more proper line of the subject, the horizontal comparison of objects. This will be noticed extensively in the succeeding observations.

A good and familiar means of proving this is, by taking the front of a house, which for greater accuracy we will suppose a perfect square. In viewing this, the eye, or rather eyes, can readily range its base, presenting upon the united vision, the whole base, in which the extremes are both distinctly presented at the same time, each eye seeming to meet the other in a middle distance, and what is still more positive of this, the two points can be both seen distinctly at the same time, that the central distance shall be but imperfectly distinguished. The same occurs if the gutter be looked at.

If instead of the horizontal range, we take the diagonal, it is true this is somewhat longer, but it will be found, that we cannot view an equal part of it so clearly. We are compelled to change the direction of the eyes, from one position to another, to get a proper conception of the whole, or of a part equal to the base or gutter. No two separate points in it can be noticed perspicuously at the same time, provided they are any ways distant from each other; nor is this the effect of the obliquity of

the view in regard to the whole front. It will be alike observed, in the elevation of a mast, a ladder, or of a pole. In these no such deception presents.

The difficulty of seeing the whole of an object, in an oblique view, more than in the horizontal, is increased in the perpendicular. Thus, we can see but a relatively small extent of a steeple close by, while a much greater extent of ground, equi-distant from us with the steeple, is seen with ease.

To return to the effect upon the house. If the point of the gutter, and that corner of the base, immediately beneath it, be looked at, with the edge of the house in a line between them, it will be found that any extent of this can be seen but indistinctly, or the two points together, still more obscurely; while the two extremes of the gutters or of the base, are at once obvious, and plainly seen, as has been said.

With the mirror, the effect can be confined to the object intended, without other appearances, making any diversion of our attention; the whole of which can be noted more decisively, and admit of more certain definition. Upon this I have repeated and varied the several experiments now to be related.

For the greater certainty of observation, and for the more close inspection of the facts, the field of vision should be diminished to the size of the object by bringing the face in near approach with the glass. The distance that will be mostly requisite, will be from three to six inches.

First, we will notice some facts from the simple reflection of the face. If the person look at both eyes at once, a thing involuntarily done when in common looking into a mirror, the parts of the face are here seen with great distinctness; or if the parts of the face be taken in a horizontal line, drawn through the eyes, or any other part of the face, we can comprehend at once all the parts under it as a whole, or its extremes, as well as any intermediate part. Thus we can look upon both ears, the ear locks, the temples, the two eyes, and the nose in the centre, and see all perfectly in one common view.

Should a perpendicular range be taken, it will be found much more limited, and much less distinct. If the part observed be the nose, for instance, it will be found that there is at no time a perfect image of it as a whole, but that to comprehend it, the eye has to pass from one point to another successively. If the view of the parts in this direction be still further extended, the extremes will be still

more indistinct, as if we include the forehead, or the eyes and mouth, a distance still not equal to that between the two ears.

The further experiments with the glass were done by placing different bits of paper in front of the vision upon it.

The first was with a small diamond shaped piece; with this were repeated the experiments that first led to the notice of this subject.

When looking at this, each eye presented a separate view of the back ground, as of the reflections of the two eyes displaced from their natural unity, so that as before there were four to be seen instead of two.

Again, if looking directly from each, to the reflection of itself opposite, the bit of paper is then seen double.

The next trial was with a strip quite narrow, and of an inch in length. Looking again at the reflection of the face, the strip distinctly presented double, that is, it had a separate image before each eye having the appearance of two pieces.

If this strip is placed vertical, it will be seen thus

doubly, and more separate and clear from each other, bisecting each other as it were vertically.

Before leaving this experiment, I will barely notice a little circumstance, rather more curious than illustrative in connexion with it. The strip is to be placed thus vertically alongside of the piece first used; it should be separated about half an inch, and placed upon one side or the other as the case may require. When this strip is opposite the weakest eye, the two spots will be seen most distinctly, and if the spot is in this situation, the two strips. This seems to show the relative powers the two eyes may have in vision.

Some further variations of this, and some of the other experiments, may suggest themselves to the curious reader. As they add no additional force to those we have or shall present, I shall leave them unmentioned,

Except one other variety of this, by adding to the outside of the small bit of paper, a strip similar to that upon its other side. The effect will be seen in the experiment, and shows very prettily the division of sight that necessarily takes place here between the two eyes. By also slightly declining the head, or by turning the glass, all these experi-

ments can be brought opposite the forehead, where they can be more leisurely and perspicuously seen.

The occurrences in each of these two may be familiar to the reader, with the exceptions of the inferences added of the natural division of vision into two species, and that there was a horizontal comparison instituted between the objects seen in the two eyes, and that these objects may be seen at once by both eyes directed to the same part, or by each presenting a separate part of the one object, or even wholly representing a new one.

The two latter results can be more accurately proved, from the two farther following experiments, and by some others.

To show the natural distribution of the vision to the two eyes, in which each partook of a part; the length of the strip of paper was increased to a greater, than the distance between the two. Then by placing the face close to the glass, a thing requisite in the preceding experiments, to simply diminish the field of vision, but that is here required for another purpose; to prevent the two extremities from being seen by either eye at the same time, owing to the intervention of the nose.

By looking along the line of this strip, the whole



can be seen and comprehended in one view ; and as neither extremity can be seen by both eyes, each has an impression upon but one eye, while the centre alone is seen by both. Yet the whole slip is seen in one united impression. Each eye, therefore, has an actually different part from that of the other to represent, as well as parts in common. The image of the object in one eye, is the continuation of that in the other, and not a common impression alike in each.

This fact can be familiarly known by looking at any extent of objects that present before us, and first closing one eye, and then the other, by which it will be seen, that the nose obstructs the lateral view upon either side, from entering but the one eye on the same side.

This consent of vision will be most beautifully shown in this next experiment, and together with this, there is a most singular and extraordinary result, no less than an apparent obliteration of the space between the two eyes, indefinitely forward.

Finding that the sight of an object, or a succession of them, did not depend upon a perfectly similar impression in each eye ; but that they represented parts peculiar to each, as well as others in

common. It was thought that these latter might be obliterated, and the separate ones alone left.

For this a square bit of paper was taken exactly the width of the distance between the pupils of the two eyes. This is to be placed at any point between the eyes and the mirror, and within lines parallel from each eye to its own reflexion.

It will succeed best by holding the paper midway between the face and the mirror, which in this case, may be at a greater distance of separation.

Held thus, it does not require so great an accuracy in the width, as when near to the eye, nor does it divert the attention as when nearer the glass.

Each eye can here receive but the reflection of itself, or rather that half of each, that is without the centre of their pupils.

All rays falling from any point between these two, are obstructed by the paper from entering either eye.

The effect of this is no less singular than it is curious ; for instead of there appearing upon each eye, the half impression of itself with their natural

separation, making the vacant distance produced by the intervention of the paper, which might have been supposed from the necessary want of the rays falling from the parts within the two parallels; this space is totally wanting. Curious as it may appear, this vacuity was not noticed, and the two visions were united into one image; that is, all that part of the face, to the outside of each eye, including the outer half of both were united in the centre, giving the strange appearance of a face with one central eye, made up in this way of the external half of the two.

This proves forcibly what I have offered, viz., that there is a united vision of the two eyes, from mutual consent, but that the vision of each is not always wholly the same.

Remark what here took place: The paper only obstructs the rays that fall upon it from all parts within the two parallels mentioned, while it leaves those to the outside of these to fall upon the eye unobstructed.

2. No part of the object seen by the one eye is seen by the other, for there is a wide obliterated space between them. 3. Each eye has a different impression, of a wholly different object, and in a more natural and undisturbed view, with a space

between, filled up by the parts now included within that obliterated ; but which is here lost by the near approach of these two impressions to one another.

If one eye be closed, it will be found that the line of the paper exactly obstructs all these rays to the inside of the centre of the opposite eye, and so of the other.

The effect produced by this concentration of the vision, giving the perfect appearance of the one united eye, will be the best guide to cut the paper by, which should be made a little wider, and gradually reduced.

The obliteration of the space of the width between the two eyes can be produced as well of any other object as of the reflection of the eye itself. Place the paper as before ; the crack of a door, or if in the evening a candle, answers extremely well : if the former is taken, it should be a little narrower than the full width between the eyes, as the obliteration will then be more striking by being perfect, and the door and door posts seem in united contact. With the candle, the experiment is equally interesting, as this is not seen, being in the included space.

There are yet other ways of varying this expe-

riment, not upon the glass, as by the intervention of a narrow board, or a book, between the two eyes, and any thing being placed immediately behind them, that part behind either is obliterated, and the two visible parts seem united in the middle. One application of these I will mention : If it is applied against a prominent wooden moulding, its prominency is no longer apparent, or at least much obscured, and the whole moulding seems imbedded into and upon a level with the plainer work.

It has since occurred to me, that this fact takes place in the wearing of spectacles, making a visible union of the two glasses into one.

I will add another single experiment here to the same effect as the one preceding the last, and which it properly should have succeeded.

For the sake of the accompanying observation of the curious reader, it was thought better to place it here rather than break into the more natural succession of the experiments upon the mirror.

Take a narrow piece of wood, about six or eight inches in length, or a pen, which may perhaps be better, from the differing forms of its extremities. This is to be held before the eye, and so near the

face, that the light passing from either end cannot enter the opposite eye by the projection of the nose.

This is known by first shutting one eye, and then the other, while holding the object before them, and placing it so that but one extreme is to be seen at once, and that from the adjacent eye. It will be found to still present its perfect length from the union of the two visions, and the whole is seen at once.

The inferences that I have drawn from these several experiments are, that each eye sees objects for itself, and more or less peculiar to itself; that this is necessarily confined to things in the parallels drawn through the two, giving a power of comparison to objects in this direction that does not obtain in any other.

The relative division of seeing into two kinds, is also mentioned, as where it is concentrated upon a common object, or where each eye has one peculiar, and united to the other by a consent of vision. As further illustrations of these two divisions, the first and fourth experiments upon the glass may be cited.

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In the natural position of the eyes, it is evident,

that the comparison of objects must be mostly confined to horizontal lines. When it does extend to the perpendicular, there are many reasons for believing it to be mostly a comparing reference with the horizontal, rather than by any more immediate comparison of one part with another in the direct perpendicular.

It is from horizontal comparison we see any deviation from the perpendicular, while in the horizontal a much greater is seen but imperfectly, or not noticed. From this it is, that we can hardly carry a basin of water without spilling, while we balance a stick with ease, and the juggler his successive pile.

It needs but a moment's observation, or the recollection of them to know, that a perpendicular object appears shorter in general, than one horizontal of the same length, and mostly so when in connexion with the latter.

The fact may be noticed in these two positions of a man; we appear longer, as the observation naturally is, when lying down, than while standing; or, when looking upon a row of houses as when looking down a street. Their elevation is indeterminate, and much lessened in proportion to an equal horizontal length.

Where the objects are large, as mountains, or an extent of high land, this lessening of their perpendicular height is still more apparent, and it gives a singular deception to the sight when another of lesser elevation is compared with them. Instead of giving the observer a more distinct idea of their own majestic elevation, they but diminish the apparent size of the lesser. This may be noticed of steamboats and other vessels while passing through the high lands up the North River, or the apparent narrowness of the river itself at this place.

The same may be noticed in throwing a stone into the water, or back upon the shore, or, when in fishing, the rod is extended over the water, or back upon the land.

Although these latter are strictly horizontal, still they are perpendicular to a line drawn through the two eyes, and hence do not admit of the comparison between the impressions of the two upon which these occurrences alone depend.

Thus our knowledge of altitude proceeds mainly from the horizontal comparison of surrounding objects, or from the horizontal breadth of the same object.

From the want of this latter, the tall thin gaunt



man appears longer than a stout portly person, of an equal length; and when the latter has become reduced by sickness, it may be noticed that he appears taller than before.

The reverse of all this, the relative shortening or lengthening of a thing horizontally, is hardly apparent, if at all.

Evidently this change in the apparent height of bodies is the result of not having a standard for comparing one point in the perpendicular with another, but by some relative horizontal surface or point. The more or less partial want of the latter must consequently impair the judgment of the vertical extent of an object. The eye being compelled to pass from one point to another, may even increase it occasionally to more than its natural length, where it is devided of objects extending horizontally to be compared with it, and which the habitual comparison of the horizontal had improperly lessened.

There must, no doubt, be a relation between parts seen equally distinct in an upright position, and upon a level, or where both may be united in the superficies of one object, and this being less in the perpendicular, the natural perception will either diminish the height of this latter, or make an

apparent increase in the horizontal length. This last being so easily and directly compared one part with another, the whole appearance of change takes place in the perpendicular. The consequences resulting from this are the visible shortening of the latter when in comparison with the former, or when devoid of this its apparent lengthening, as in looking upon an upright pole, or a tall person.

Both these can be seen at once in looking at a vessel, the first appearing in the diminished height of the hull out of the water, and the latter in the tallness of the masts.

This natural relation seems provided for an otherwise defect in seeing, the whole of which is truly deceptive, and which requires comparison to regulate; and as this strictly extends only in horizontal lines, the mind has supplied the defection of it in other directions, by instituting a mental comparison in these latter, and no doubt drawn from the relative difference in their perspicuity.

But from this greater freedom of vision, and the ease of comparison, one thing with another, in lines parallel with the axis of the two eyes, it is of itself a source of deception, as has been shown, diminishing the elevation of broad objects, and increasing oftentimes the length of those that are narrow, or

are more fully and perfectly seen by the eye close by.

This latter is only when the object is placed so that its perpendicular length may be fully comprehended in one view. A long diamond of paper will show the fact very well by placing it in these two positions. This is, however, probably to be attributed to the oblique view of it horizontally from each eye, by which the angle made by the rays with the surface of the object, is rendered more acute.

To convince myself that there is no deception in what has been said of the relative shortening of the perpendicular, when compared with the horizontal, I reclined my body, so as to make the line through the eyes vertical, by which means the comparison of objects between the two is made vertical also, instead of horizontal, as in their natural position.

In this way it was actually found that the whole field of vision changed its character, and what was formerly and naturally observable in the horizontal level, was now changed with the vertical position of the eyes. The fact of the visible increase of the length in the perpendicular direction of any thing which made the immediate object of the experiment, was plainly observable. The objects to which

I directed my attention, were the door and windows of my room ; each of these were obviously increased in their length, and diminished in their diameter.

There are three subjects, in particular, that are in connexion with what has been gone over, still remaining. All, or either of these, I should feel happy fully to explore ; as it is, I can but barely look at them, as it were, from afar off, as the promised possessions of some more fortunate and abler explorer. I shall, however, rest contented if I shall have safely conducted him to the spot from whence he may start his survey.

These remaining subjects are the idea of visible motions ; and if philosophy admits of a pleasure in seeing the pleasures of vision, or in more familiar language, the beauty of objects, together with a further division of sight in these two directions, by which the one represents the comparative sameness, and the other the difference of form, of all observed objects.

All these are in close connection with the phenomena mentioned, particularly the comparison between horizontal objects ; and first of motion :

Motion itself is the change of a body in posi-

tion or place. But for this fact to be noticed by the eye, something more is required than for the simple observance of the body. For as seeing depends entirely upon the transmission of light from the object seen to the observer, and as this passes in right lines through the atmosphere, the motion of a body must have been very indistinct, instead of its great accuracy, had no additional circumstance been added to the mere vision of the object while in motion.

The consciousness of motion is probably attributable to two causes, the first is the change of situation in the impression of the object within the eye upon the retina, and next by a vacillation of the eyes between the object, and those it moves by or from, or rather the relative comparison of the one object with others, which here is the body moving, and those it passes or leaves. The comparison is noticed by a defection of a part of the object it moves before, or by an apparent vacuity in its rear, which is successively filled up by the new objects presenting from behind.

I strongly suspect, that while one eye is engaged upon the object, the other attends to the motion, for while we watch the motion of a thing, we see it indistinctly, and we prefer looking behind it to do this, rather than before, by which, while one

eye is fixed upon the object, the other may be vacillating between the object and those it discovers from behind ; the relative separation of which giving the consciousness of motion.

There possibly may be another source for the perception, or rather sense of motion, which is the sensible motion of the eye itself in its socket while moved in the progressive line of the moving body.

This cannot, however, be very great, as we see rapid motions but indistinctly, while those in comparison slow, are seen with more accuracy. If it has much effect, it must be in the ascending motion, where it may supply the imperfection of other means.

Motion like comparison is most perfectly noticed in the horizontal direction. Both proceed from nearly similar causes, and in part the same. We can watch the motion of a thing passing in the parallels of the eyes, better by far than we can when ascending, or directly approaching.

Thus the approaching clouds of a storm are hardly noticed in their progress to us, but while passing sidelong over us, we then see the rapidity of their aerial course, and they remain long after this above the horizon.

This fact is equally obvious when a flight of birds, or a single one passes over our heads. While they are immediately passing by us, we then can observe the swiftness of their winged flight, and if it be attended to, this seems rapidly and sometimes almost instantly to diminish, and in an extremely short time is indistinct, and they seem only to vanish from us by diminution.

There is yet a place where we can watch this perception of motion with far greater accuracy. I mean upon a clock, and more particularly from its more rapid motion, the second hand of it. In the revolutions of this, we can see and observe its motion when passing in directions perpendicular, and horizontal to the united axis of the two eyes, and as it moves at all times with an equal velocity, the changes in the perception of its motion by the eye will be more positive than in any other place. And here I have noticed these changes decisively. While the hand was perpendicular to the face, the whole sweep of its motion is distinctly seen, but when horizontal we barely see the irregular action produced in the motion, but have nothing of the perfect view of the actual motion as in the other direction.

The same facts have been noticed from their singularity, when looking at the revolving wheel of

a carriage in motion, and particularly at the top, and at the horizontal axes of it, the ground below diverting the attention.

Of the accuracy with which we can notice horizontal motion, the occurrences are familiar : every foot passenger and passing carriage presents the opportunity anew. How minutely can this be seen, and with what wondering accuracy in the proper positions for it in the clock, during the passage of the hands in the positions perpendicular to the face. Not only can this motion be seen in the second hand, but also in that for the minute ; and accurate observation might possibly discover it in the hand for the hour.

The next subject is the pleasures of vision. These, when they shall be fully examined, will open an astonishing field to the investigator in search of the curious, or for the more useful research of the philosopher.

I shall, or rather can do little more than trace it in connexion with the principles laid down.

The facts connected with this are singular, and many will surprise. In truth, it may be said, that the whole pleasure of seeing depends upon the sameness of objects in the horizontal, from the accom-



panying comparison, and variety from the want of this in the perpendicular.

There is another division, but conformable to this rule also. It is from the equal perception of all the parts of an object, so that they may be seen in every part with equal distinctness in one whole view, and hence determining them into particular shapes. To this may be appended a variety, simply requiring a determinate proportion of extent and elevation with no certain object included.

The first of these divisions is, that in which the beauty depends upon comparing objects similar to one another, in parts horizontal to each other, and at the same time varying in the perpendicular from the want of this comparison.

Each of these can be observed in architectural columns. The shape of which no doubt has been determined by these till now unknown rules.

In these the beauty horizontally is similarity one with another, and the equi-distance of each ; while all of them viewed perpendicularly, change their form as we look upward, and the spectator looks rather for difference than sameness, between any two of their parts, as between the pedestal and column, or either of these with their corinthian cap, or surmounting cornice.

The same things are equally true of the whole building, and wherever it may be observed in visible objects, it will materially affect their beauty. In nature this horizontal similarity occurs naturally, and in the attempts of art, it is always an included requisite to complete their beauty.

To admire the beauty of any thing, it must also be seen distinctly as a whole ; the rays from every part, and particularly of the whole circumference, must produce an equal impression, and must be seen with equal distinctness.

The perpendicular not being seen with equal distinctness, and to the same extent as the horizontal lines of the body, it is requisite that the former be less than the latter, and these will determine themselves into certain determinate proportions.

It is hence the diamond or even an oblong is conceived to be more beautiful than the square, or an ellipsis than a circle.

The whole object being distinctly comprehended in these cases, the beauty of them is no longer judged of by horizontal parallels, but as a whole, although the law still operating, determines the form of this whole.

The influence of these laws will, therefore, give certain determinate proportions, for their forms, in which they will appear most perfect.

In the square the perpendicular sides are seen less distinctly in their whole length than the others, as also the extremes of the vertical diameter of the circle.

The obliquity of the diamond, or the oblong direction of the ellipsis, make them appear more beautiful than these their more perfect forms, only as they conform to this defect of vision, in its vertical range.

It is from this also that the diamond loses part of its beauty when resting upon one of its bases, or the ellipsis upon its medium diameter.

But the diamond and ellipsis still appear more beautiful in all directions than do the square or circle. This may at first seem to destroy the rationale we have given of it: that it is merely owing to a defect of the view in the perpendicular elevation; but it does not.

Their retaining their beauty in other positions than their proper ones, is to be attributed to habit only.

That this blinds us to some faults, and destroys some beauties, is familiarly said of other circumstances. This is observable in every thing, but most obviously in vision.

It is this that fixes us to our native spot. From this we miss the defective beauty of the friend, or lose the pleasing perfection of it in the mistress, in the more substantial kindness of the one, or the virtue of the other. It is equally applicable here. Having become pleased with the position of the form, habit created a pleasure in viewing the form itself, and which might accompany it through any change of its posture.

Of the effects of habit upon vision, it need only be said that things are properly seen double and inverted, still the impressions we receive are single, and in their natural positions, and although the two eyes can act independent of one another, yet such is their mutual consent, that they are inseparably busy at all times upon a common object or objects. All of which is to be accounted for by habit only ; and if such are its effects, how is it possible for it not to extend to these circumstances ? It in truth embraces all vision.

It is also this that produces the depravation of

vision, destroying its chaster perfections, as when acting in agreement with more fixed laws.

To this is to be attributed the depraved taste of beauty, too common in the more beauteous sex; their preference of colour over form; of forced contortions of themselves over their more graceful and natural luxuriance of charms; or, where it is more general, in the vitiated ideas of rural scenery in the citizen.

These forms, the diamond and ellipsis however, do not appear so beautiful in any other position. Both will be seen to look by far best with their long axes horizontal.

The variety of this rule is next to be observed. In this there is a certain relation of the perpendicular to the horizontal, with no one particular or prominent object, but in which there is required proportion of the two to one another, which is not equal, though apparently definite.

This strictly is the same with the last mentioned. The only reason for making a division of them is, that the former is more properly limited to single objects, while this is extended to more general views, where no particular object immediately attracts the vision, but where all are united into one

general pleasurable image, as in landscapes, sea views, &c. The one is but the extension of the other, and both are often united.

In any views of this kind, we apparently select certain bounds for confining the vision. In the wide fields of nature, these limits are embraced in imaginary lines. There are still, however, definite bounds, by which the observer of nature surveys the whole by parts. It is to this we must attribute the known delights of the embosomed valley, or where undulating points give a pleasing limit to the ranging view.

That there are definite bounds in nature, by which the view is limited, when looking upon them, is more obvious when fixed and differing characters are given to these bounds. This is done when they are copied upon canvass, and more especially when framing them into pictures.

Here instead of the horizon above, the water in front, and the dimness of lateral objects, making nature's imperceptibly bounding marks, the tinsel gilt upon the frame of the one, or the rough wall upon which the arras may be stretched at once abruptly or rudely, arrest the more calm and even scene.

In these, the necessity is observed of adopting fixed and proportionate forms, which are evidently drawn from these rules.

Thus we never like a square picture ; and if one occasionally pleases with its longest sides perpendicular, it is attributed to the object itself having this form in nature, or the habit we have drawn from viewing similar ones horizontally.

As it is, a landscape is seldom seen drawn in this way. It is mostly confined to views of animals, buildings, mountains, &c.

That any thing to appear beautiful, must be seen as a whole, holds equally, if this is but part of a greater whole. The whole part must still be seen perfectly, and it seldom pleases unless somewhat insulated. Thus the designs of the reliefs upon the pedestal may be admired, or the just form of the pedestal itself, or the whole column ; and again, the complete building in relation to others that may surround it.

But, if we alone look upon any of these as parts of a greater whole, instead of insulating the view of them, the beauty of the part is then lost in the imperfection of the whole view.

A ludicrous, though no doubt a good proof of this is, that it is the misfortune of peeping— anxious to see the whole, it loses all pleasure in any part.

There is yet one more consideration in relation to the perception of any body as a whole. It is the distance at which this view is best obtained.

It being required that the object to appear beautiful be seen distinctly in all its parts, and as objects vastly differ in size, the viewing of them properly will be determined at more distant or near approaches in proportion to their size in nature.

The mountain view thus pleases at a distance, proportionate to its height; the rainbow is seen nearer, and we but see the beauty of the butterfly when close by. When the object is too minute for perfect comprehension, we extend their magnitude by the microscope, until their visible size makes every part distinct.

Another requisite, that constitutes the beauty of some particular objects, is their mere elevation, where the horizontal breadth is not proportionate, as in the column singly considered, or where the beauty is still more strictly confined to this principle in the steeples and domes of public edifices.



There is a certain and peculiar beauty in these, that rises unto real grandeur. The whole, however, is still confined to the horizontal comparison of any one point of their elevation, as connected with those above or below it.

In steeples particularly, all the minuter ornaments are made similar only to those horizontal with themselves, while those perpendicular to one another are made to assume every variety. The same is true of any one part of the whole steeple taken in these two directions. Consequently the whole is but one continued succession of horizontal comparisons of new beauties, changing as we elevate or depress the view of them. While their form horizontally, therefore, is definite, that in the perpendicular may be made to assume any elevation, and almost any shape, only so far limited that any one horizontal comparison shall hold some regular relation to those of the other different points of elevation.

Simplicity is also a well known requisite of beauty ; much as variety may delight, there still must be some arrangement in it by which this is made a simple variety ; but a variation of similarity.

The beauty of simplicity has long been a known standard for the taste of true elegance, apparently

claiming its character arbitrarily. Its source, however, is now fully exposed, and after having thus long been dependent for its estimation merely upon the fewness and perfection of its graces, it may now legally claim its character as a requisite of real beauty.

If as we have shown, beauty is dependent upon comparison of horizontal similar objects, and of various ones perpendicularly, and that the whole object must be seen with equal perfection to fully please ; it is evident, that the fewer the principal objects are, and of the points of comparison upon them that they have horizontally, and the more simple is their variation in the perpendicular, the more distinctly and accurately can the whole be traced ; and it is upon this accuracy of their view that their beauty depends.

There is a series of speculations relating to these laws and to habit, yet not distinctly confined to either, but rather appearing as the result of all these laws ; with the addition, often, of their perversion by the force of habit : It is the beauty of humanity, as well in its native simplicity, as in its gayest or gaudiest dress.

Habit has shown its defective vision here most sensibly, and most conspicuously here, where the

gracefulness of beauty is most bountifully outlined upon the fairer forms of the fair. With whom to hide nature under habit, to conceal real beauty by fictitious dress, and the whole by more artful address make too much of the whole study of their gayety, but it is also their own waste of true beauty.

Upon this intricate subject, I would not dare to have ventured, but for its immediate connexion with what has preceded.

I shall merely pass over this beautiful, if not vast field of beauty to make my claim as discoverer, and leave the more permanent improvement of it to the explorer, who may have more of applicable industry.

The comparison of one object with another, upon a level with the united axes of the two eyes extends itself extensively into this beautiful department of its range, and still remains the regulator of all true taste for its charms or their dress.

After all that habit has done to dispossess it, this last appears mostly in the false colouring, while it leaves the shape and its just arrangement still with the direction of the former.

Beauty in this manner, whether native or drest, is examined more from right to left, than by any comparison in the range of the head and feet.

For intentional brevity, I shall select but a few of these from the innumerable many, and their varying gradations. These few, after the much said already, will illustrate the theory as extending to the rest; and I shall mainly confine them to those occurring in the face.

Whatever may be the various taste for beauty, as seen in the face, all are agreed in requiring a perfect similarity of one side with the other. How readily is any variety between these remarked; instance the deformity of one eye, or any change of one from the other, while the equal distribution of the defect sets both aright again. So also, in the case of one cheek with another, or the mouth drawn awry to either.

But if we recur to the height of the face, what differences occur in individual and in general tastes. The change between these two views of it, are not less than what is known of fact and opinion, which seem to hold a relative sway here, in the one and in the other.

What a wide boundary is given to the taste for beauty, if taken in this latter direction, not only among different persons, but even in the same individual ; nor is unity of form among any of the parts of the face required in this direction. A long and a short, a broad and a thin face may be often alike admitted for an equal claim to beauty.

How often are these also found united with every variety of feature, the forehead ; a high or a low one ; small, large, black, and blue eyes ; nose aquiline or Roman, long or short, and occasionally a pugnacious admixture of the two ; mouths of all capacities ; and the chin short, or prominently long, single or double, yet all shall make parts of different beauties.

And again ; if these taken horizontally, in united profile view—what a picture !

Singular as it may appear, all this variation takes place without necessarily making a defect, while the slightest deviation of one side from the other, or the nose to either, is immediately seen, and sensibly impairs the appearance of the whole.

These facts are equally apparent in every other part of the body. No sameness is looked for in the perpendicular direction of it ; as of the

head with the feet, the extremities with the trunk ; or the upper with the lower set of these. But when any one part of the body differs from its opposite, it immediately destroys, as is said, the symmetry of the whole. The defect never escapes notice. Of this we may daily see many instances

It will be too lengthy, and almost needless, to go through an examination of dress here, which would be to repeat the application of principles already fully pointed out.

The remarks just past, which were applied to native beauty, sufficiently explain most of this.

The pecu'iar details of this subject are thown into much intricacy from their changeable variations, and at the same time made very irregular and obscure, from their extensive connexion with habit. This is daily seen in their repeated changes, alike singular and uncouth, when introducing, alike odd, ugly, and disfiguring when past their more natural dates ; but all of them perfection's very self, when raging. This is not confined to individuals, but extends over all, and envelopes every one.

But amidst all this confusion of iridescent chaos, I may still venture, I believe safely, to say, that a comparison of the horizontal, levels most of its irregularities to her dictates. Thus, whether the

shoes be of "leather or prunella" they must be like each other, paired mates, and the whole dress of each side, in general, must exactly correspond with that of the other.

Another fact, that is common to the dress and undress of beauty, will exhibit the effect of the unity required in the parallels across the vision, strongly. If either lie in a horizontal direction, and the spectator view them from one side, he will find this union of the opposite sides much impaired, and habit alone saves it in part. I suspect it is also partly hence, we have the beggaring description of the drunkard.

Again, by placing himself in a line with the feet, all the beauty of their upright posture will be revived afresh, and the comparison be, as usual, one side with another.

The whole principles of true beauty may thus be determined upon fixed and permanent laws. I would wish to shew this here, but I feel myself incapable of following the height and depth, or the wide lateral expanse of this subject, through all its mazes of new beauties. I wish rather to float over its surface, observing the beauties that lie beneath its chrystalline deep, than dive deeper, and risk drowning to obtain them.

I will barely again refer to the more regular forms of architecture, or to the wider and irregular beauties of nature.

The first are fair proofs of what I offer, and undoubtedly show the correctness of these determinate laws.

Whatever habit may have deformed elsewhere, either in taste or shape, there are still few but are sensible that there is a justness in the beauty of this department of visionary objects, and that they are founded upon fixed rules. The departures from this regularity, are vulgarly noticed. Its influence in giving the shape and form to the column, we have already remarked. There is one general fact in architecture, extending through every part of it, that proves, with great force, what has been said. All the lines in building are either perpendicular or horizontal, and all similarity is confined to the latter.

In nature, there is more of irregularity : there is a universal similarity, but every where blended with an agreeable variety. The beauties of nature please in difference, not however studiously differing, but in a native pleasing difference of beauty : And how faint are the beauties of art to this nature's looser dress ?



Who does not admire nature's rudely, and wildly, and boundless, bounding scenes, in this changeful variegated dress?

It is by the bold and noble daring of nature that it so greatly pleases, outstripping these laws claiming by all beauteous difference what art does by comparison. This makes her certainty of pleasing.

Not willing to submit her forms, and even contortions to forced constraint, nor her gay wild scenes to regularity, but bringing them all in her native wildness of luxuriance; her vines in clusters, trees in varied forests, and scenes in all variety that from fertile plains, next undulating through every change of scenery upward, arrest the farther view by bold and rocky steeps, towering in icy snow-clad pinnacles mid the skies, and here hurling her furies, and her flames revolting back in the front of higher heaven; and again, surrounding these by the broad expanse of oceans, and interspersing them with meandering streams that wind their collective ways into rivers, which glide with silence in a calm decline to their great maternal bosom; or, at times dashing their mild pellucidity over her most appalling precipices, hurling them with relentless fury into the depth of the abyss beneath.

Thus nature defies restraint, while art has to yield it homage ; how often servile, how often unsuccessful in her best efforts ; how often mere grimace. In all, still bowing to a legal task master. While nature pleases in graceful difference, art has to strive for its worth in imitation or in studied symmetry.

There still remains one more fact to mention of importance in vision, or rather the observance that may lead to one. It is, as I believe, the division of sight between the horizontal and vertical directions, by which, while one represents the comparative sameness, the other supplies the difference of form in the same object.

This is seen in the changes of fashion, or in the architectural column.

Thus while beauty in one direction is sameness, that of the other exists in difference, making an insensible contrast that may in part account for the great perfection of a sense, apparently from its nature so imperfect as vision.

The positions we place things in, when looking at them, will also illustrate the principles we have laid down.

To comprehend a perpendicular object of any magnitude, instead of inclining the head directly back, it is usually turned to one side or the other. This is done to increase the field of vision, by introducing the comparative view of the two eyes.

Where the object is small, or we hold it in the hand, we avoid the necessity of this change of position, by the inflexion of the object.

Where we hold a thing before us to ascertain its length, we invariably turn it horizontally, for the greater accuracy with which any thing is seen in this direction. The effect may be discovered by again turning to an opposite direction.

So, also, if two things are compared with one another, they are always placed sidelong. The effect will be seen in both positions by placing two similar coins upon the hand, and changing it to each.

Or of a book that we are reading. This is always held so that the lines are parallel to our own eyes, whatever position we may be in at the time.

By changing the lines so that they are vertical to the eyes, the great difference of effect will be seen.

Although in this position a word or two is seen distinctly, the reading cannot be anticipated as it were, and as is done in the more common position by passing the eyes further along the line, and still seeing that more immediately under notice.

The effect is decisive of these rules.

Something may still be deducted from this; for here, as in other cases, the single eye is itself improved, in this united direction, by the habit of comparison in it.

We can read comparatively well with one eye, and this may extend itself to such as have but one, by the accidental loss of the other, from retaining this power of comparison already acquired. I have not met with any person, who has always seen with but one eye, nor of a person having the sight but of one alone restored, from infantile blindness. I cannot, therefore, speak of this power of comparison with them, in horizontals. I do not however now remember having ever heard any warm expressions of the beauty of any thing seen, from persons seeing with but one eye.

I should, however, expect in all such persons, that the comparison of objects is still retained, for the range of objects is horizontal, the frequent necessity of its use, as in walking, &c. and also from the greater stability in the motion of the eye, being in this direction.

It might be supposed by some that these alone would be sufficient to account for all the phenomena we have mentioned.

But any extension of these, or of habit in any other way cannot account for many of these occurrences. There appears no positive necessity for any one part of the column agreeing at all with what is above or below it, except what depends on the relative comparison of one horizontal with another.

If this was alone done by the greater facilities of sight, it would be only in relative proportions, agreeing with those we have stated, between the perpendicular and horizontal, in general, and the consequence would be, the reduction of all beauty to shapes similar to diamonds, oblongs, or ellipses, as is the case when any thing is considered beautiful merely as a whole, and embracing all the vision with abrupt margins.

That it is not the case, will be obvious if we imagine, or have seen, a picture of mountain scenery, on one side, with a sea view on the other, instead of the former in the back ground, and the latter in front. Here the full force of habit has already its effect upon the front of the picture, and even here divides its influence with more fixed rules.

A picture like this displeases, upon other principles, and it is needless to prove them to be those so often referred to.

The differences between the effects of habit and vision, in a general sense are shown more particularly in relation with comparison. But as comparison may be said to be the effect of habit as well as all vision, it may be well to define what is intended to be meant by habit in vision, as distinct from every thing else. The definition we would give of it is, that it is the mere pleasure of viewing any object, independent of its form, and dependent upon some other considerations, as long familiarity with the scene, the intrinsic worth of the object, or the effect of education, attachment and the like.

To more or less of all these considerations, are the changes of fashion or of dress to be attributed. It is also noticed in the vulgar representations we sometimes see of nature, or in the burlesque of satirical caricature, and in the grotesque forms of Chinese fancy. In these the wide difference of its effects from regularity, or from regular laws is seen.

The reader will permit me, again, to call his attention to this beautiful regulation or division of sight, by which effects are produced that never

could be, in the greatest nicety of a plain impression.

It seems a kind of intersection of all visible objects by a set of lines crossing at right angles, every observable point in them, in the horizontals, watching for sameness and comparison, and in the perpendicular, looking for their difference and their form. Again, securing any defect by the comparing of two images of the whole at once, and still as if studying to vary without confusing, has permitted each eye to seek its own peculiar image, while it retains the more voluntary power of concentrating their more scattering sight when requisite.

I have thus adventurously dared to look into this curious subject. I have thus far in particular cast a distant, though I hope not less certain, look at the height and breadth of beauty, that like a broad expanse of waters seeks its own level. I have thus far passed over a subject where the eye has been deluding the mind with new visions of no fancied beauty, but still in gayest fancy drest, defying in plenteous and boundless changing variety, all definition ; and yet how definite !

The proper and accurate, or even regular examination of all which I have not presumed to attempt ; sensible of its too great extent, for so

superficial an observance as I was alone able to give it. It was for me merely to point out the facts, as having noticed them, and to notice the circumstances in connexion with them and such as might make them tolerably clear for a more close investigation, a more capable investigator.

All therefore that I have attempted to have done, is roughly to have laid out the outline of some new views for speculation—opening a new field for philosophic vision.

THE END.

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### ERRATA.

- Page xiii. line 13, for "*some farther*," read "*some further*."  
39        2, for "*each other*," read "*each eye*."  
44        6, for "*the centre of the opposite eye*," read  
          "*the centre of itself*."  
45        6, for "*If it is*," read "*If either is*."  
68        22, for "*are*," read "*is*."









